

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT HIGH PROFILE SURFACE BARRIER FOR CDI

Identification No.: RL-DD051

Date: August 2001

Program: Decontamination and Decommissioning

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-CP01

Waste Stream: Containment of LLW Debris (ER-05, risk = 4) and MLLW Debris (ER-02, risk = 4)

TSD Title: N/A

Waste Management Unit: N/A

Facility: Materials processing facilities (five processing canyons)

Priority Rating: This entry addresses the Accelerated Cleanup: Paths to Closure (ACPC) Priority:

- ☒ 1. Critical to the success of the ACPC
- ☐ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: High profile surface barrier for the Canyon Disposition Initiative (CDI) Project.

Need/Opportunity Category: *Technology need* - there is no existing or currently identified technology for the project baseline.

Need Description: A surface barrier design is needed that provides for steep side slopes (e.g., 1:3) yet still protects against water infiltration, wind and water erosion, and plant, animal, and inadvertent human intrusion.

Schedule Requirements:

Earliest Date Required: A high profile barrier may be needed for operations as early as year 2008.

Latest Date Required: Unknown.

Problem Description: Fifty years of defense plutonium production resulted in the construction of five large material processing facilities at the Hanford Site. An acceptable long-life surface barrier would help support decisions to cap these facilities in place. Currently, there are no proven designs that accommodate the large side slopes that would be necessary to cost-effectively cap such facilities. This need relates to functions number 2.0 and 3.0 of the CDI Feasibility Study.

Benefit to the Project Baseline of Filling Need: Fulfilling this need is critical in enabling the use of the canyon facilities as waste disposal facilities. Without sufficient barriers and sufficient

information to support the use of them, the facilities cannot be used to the maximum extent for waste disposal (i.e., intact and used for disposal) and the potential savings will not be achieved.

Functional Performance Requirements: The barrier design should meet RCRA requirements. Quantitative requirements will be a function of the contaminants remaining or disposed in the facilities. At a minimum, the barrier design should minimize wind and water erosion, limit water infiltration, and prevent plant, animal, and inadvertent human intrusion. The barrier should channel precipitation away from the waste site and require little or no maintenance. The barrier should be stable and retain its performance features for a minimum of 500 years. The barrier must meet these requirements for situations where the barrier is elevated as much as 60 ft above the surrounding terrain. This technology need relates to the generation and subsequent regulatory acceptance of adequate design, selection, validation, and monitoring results. Acceptance of these results will allow an environmentally sound, cost-effective, design for barrier implementation over decommissioned intact facilities.

WBS No.

1.4.03.3.1.04.05.03.01.41.03

TIP No.

TIP-0007

Relevant PBS Milestone: PBS-MC-030

Justification for Need:

Technical: Installation of long-term barrier options with design lives of 500 or more years and extensive side slopes requires very high quality testing to confidently predict design performance. Without the availability of the steep slope barrier, certain CDI Project options will become infeasible.

Regulatory: The applicable regulations will depend on the nature of the waste in each facility. It is expected that all or portions of 40 CFR 264 and 265, 10 CFR 61, and 40 CFR 192 will apply, in addition to DOE Order 5820.2A.

Environmental Safety and Health: The use of surface barriers instead of exhumation or decontamination and collapse of the facilities is estimated to dramatically reduce worker risk.

Cost Savings Potential (Mortgage Reduction): Rough order of magnitude (ROM) life cycle cost (LCC) savings of up to \$70M (based on the potential costs and savings identified in DOE/RL-2001-29 Draft A). A Record of Decision (ROD) will determine the disposition of the 221-U Facility. A decision to reuse all Hanford materials processing facilities as a waste disposal site could result in a potential cost savings of approximately \$70M. Meeting this technology need will support obtaining a ROD.

Cultural/Stakeholder Concerns: Stakeholders have expressed concern about leaving waste in place, particularly along the Columbia River. Stakeholders have expressed the desire for highly predictive performance testing of barrier designs prior to selection of barriers as remediation options at waste sites.

Other: There are five main processing facilities on the Hanford Site, two at Idaho and one at Savannah River. Technologies that meet the needs of the 221-U Facility will be applicable at these and other similar DOE facilities.

Current Baseline Technology: Current barrier designs for meeting RCRA requirements for landfills use relatively flat side slopes (1:5 to 1:10). However, such a design for the entombment of tall structures, such as a materials processing facility, would be impractical because of the large volume and cost of the required barrier material.

End-User: Waste Management Project, Environmental Restoration Project, Facility Stabilization Project

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